NOVEMBER-DECEMBER, 1946

THE BULLETIN OF THE

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AMERICAN SOCIETY OF HOSPITAL PHARMACISTS

THE BULLETIN
OF THE
AMERICAN SOCIETY of HOSPITAL PHARMACISTS

Volume 3 NOVEMBER-DECEMBER 1946 No. 6

THE BULLETIN is published bimonthly by the American Society of Hospital Pharmacists, a national organization devoted to the profession of hospital pharmacy, dedicated to the interests of the hospital pharmacist, and pledged to co-operate with the American Pharmaceutical Association with which it is affiliated.

Contributions of articles by hospital pharmacists, or by others interested in the progress of this important branch of the public health profession, will be accepted if they are of general interest to the hospital pharmacist. The editors reserve the right to revise all material submitted, if necessary.

Manuscripts submitted for publication should be typewritten in double spacing on one side of paper 8 1/2 x 11". Whenever possible a photograph, drawing, or printed form to illustrate the topic that is discussed in the article should be included.

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American Society of Hospital Pharmacists

Correspondence

Sirs: I wish to take this opportunity for commending you for the splendid job you are doing. As a pharmacist in a Veterans Administration Hospital, I am charged with the task of preparing and distributing to the hospital medical staff technical information on new therapeutic agents, including dosage, contraindications, use and precautions. THE BULLETIN of the A.S.H.P. then becomes my chief source of information.

Moreover, the style in which the valuable information appears is very impressive. I look forward impatiently to each edition. I sincerely hope that you might find it possible to publish THE BULLETIN monthly. Many thanks to the editors for their magnificent work.

A. W. Davidson
Chief Pharmacist

Veterans Administration Hospital
Dearborn, Michigan

Sirs: I was very pleased to have the opportunity of attending your convention this year and especially to meet a few hospital pharmacists from across the border. I am also pleased that I may make application for membership in your society. I am enclosing eight dollars. I understand five dollars is for membership in the A.Ph.A.

Mary Wholey
Dispensor

University of Alberta Hospital
Edmonton, Alberta

Sirs: When your society was first organized I was a charter member. Unfortunately, however, when I went into the service I had to let my membership drop. I am most anxious to get reinstated and would you kindly send me an aplication blank.

Richard S. Vowles

Rt. 2, Box 62
Mill Valley, Calif.

Sirs: Enclosed please find my membership blank for admission to the American Society of Hospital Pharmacists. I am already a member of the A.Ph.A., and have paid my dues for the current year. I am very interested in the society as well as in hospital pharmacy. I enjoyed The BULLETIN I received and found the articles therein very stimulating. Hoping to be of some service in the advancement of the society I am,

Sister M. Denis Bost

New Castle Hospital
New Castle, Pa.

Sirs: Would you please send me information about the American Society of Hospital Pharmacists. We are interested in having our pharmacist become a member of some group and would like to find out the necessary prerequisites for membership.

Gerald A. Bax
Administrator

Ferguson-Droste-Ferguson
Rectal Clinic and Hospital
Grand Rapids, Michigan

Sirs: I am employed in a professional pharmacy and we work closely with several of the hospitals here. I do not know if this entitles me to become a member of the American Society of Hospital Pharmacists, but I am very anxious to receive your bulletin. It is a great source of information related to professional pharmacy. I would greatly appreciate obtaining a certain issue, Volume 2, Number 5, 1945.

Gordon Lamb

10401 E. Jefferson
Detroit, Michigan

Sirs: We are interested in contacting students who desire hospital pharmacy internship.

Sister Antonia

St. Paul's Hospital
3121 Bryan St.
Dallas, Texas

EDITORIAL

In recommending a limit of six months credit for practical experience gained in hospital pharmacies the National Association of Boards of Pharmacy is advocating the perpetuation of an unfair, unwise, regressive, and discriminatory ruling against one of the most rapidly advancing specialties in pharmaceutical practice.

Here is article two of the recommendations of the N.A.B.P. limiting credit for experience gained in hospital pharmacies:

> 2. To assure a well rounded practical experience, not more than six months of credit per year shall be given for practical experience obtained in a hospital pharmacy and not more than six months credit per year shall be given for practical experience obtained in a pharmacy or drug store compounding less than 1,COO prescriptions annually or devoting less than fifty percent of its activity to the sale of drugs and medicines and supplying pharmaceutical service.

If this recommendation is adopted it will mean that the individual who chooses hospital pharmacy as a career will be forced to obtain a portion of his required experience in a drug store, with resulting loss of time and effort and the breaking of continuity in his hospital training. It will tend to discourage the entrance of graduates to hospital pharmacy, a specialized field, which because of current trends in the scheme of medical care, is growing ever more important and fruitful to those who wish to practice pharmacy. Further, it will make it more difficult for those hospitals attempting to perfect a system of internshipfor the training of hospital pharmacists. Thorough training of those planning to practice pharmacy should be encouraged. And certainly when a hospital pharmacist devotes much thought and planning to the development of a well-rounded course of instruction and experience in pharmaceutical practice for the recent graduate his efforts should not be penalized by such shortsighted rulings.

It is granted that the Boards of Pharmacy should establish high standards for the practice of pharmacy. It is further granted that it is the duty of the Boards of Pharmacy to insure that the graduate pharmacist may gain his experience under the supervision of a registered and otherwise properly qualified pharmacist. It is acknowledged that the recent graduate should obtain his experience in an institution, a retail drug store or a hospital pharmacy, where he may acquire broad practice in the compounding and dispensing of physicians prescriptions. This practice should be sufficient in amount and variety to provide for satisfactory training in such basic pharmaceutical principles as extraction, desiccation, filtration, distillation, solution, and sterilization. It should include the preparation of medicinals involving various forms of chemical change; the manufacture of such preparations as mixtures, suspensions, emulsions, lotions and liniments, ointments, suppositories, powders, capsules and parenteral products. The student should obtain a knowledge of the common incompatabilities, prescription reading, and labeling. He should have the opportunity to become familiar with the business aspects of pharmacy including bookkeeping, inventory, purchasing, pricing, and so forth. He should gain experience working with the allied professions of medicine and nursing. And he should have experience in dispensing to the public. This basic training may be obtained in a hospital pharmacy.

Let the Boards of Pharmacy establish standards for the practice of pharmacy. Let them set these requirements as high as seems desirable. However, if hospital pharmacies meet all standards as established by the Boards of Pharmacy, then it is unwise and unfair not to grant full credit to those who choose to obtain their experience in a hospital. The fact that a pharmacy happens to be located in a hospital is not sufficient reason to penalize those who wish to practice there.

Hospital pharmacists are glad to comply with all regulations of the Boards of Pharmacy. They welcome all efforts to elevate standards for the practice of pharmacy. They believe the Boards of Pharmacy should establish high standards for pharmacy wherever it is practiced in order to safeguard the public health. But they also believe that the standards should be established for the practice of pharmacy as such. And if hospital pharmacies meet these standards they may well ask "What is the justification for granting only partial credit for experience in a pharmacy that meets all state board requirements - but happens to be operated in a hospital"?

PHARMACY SERVICE in the VETERANS ADMINISTRATION

W. Paul Briggs

Director, Pharmacy Service, Veterans Administration

My invitation to speak to you today originally carried a suggested title of "Pharmacy Administration in Hospitals." While I was greatly pleased at the invitation, I promptly disclaimed any qualification to address you on the subject selected. I was compelled to do this because I have had much less experience with that subject than most of those present here today. As a matter of fact, my hospital pharmacy experience, obtained over twenty years ago, was barely sufficient to qualify me for membership in the American Society of Hospital Pharmacists. In changing my subject to describe the overall Pharmacy picture in Veterans Administration, I trust I will be bringing you a matter of some interest, although I cannot discuss with authority, pharmacy administration at the hospital level. To be completely frank, I hope to acquire during my visit at your convention much information on the very subject on which I was originally scheduled to speak.

The subject of Pharmacy in Veterans Administration covers a wide variety of functions. In my personal judgment some hospital administrators lack complete understanding of the total capacity of Pharmacy. A notable exception to this is General Paul R. Hawley, the Chief Medical Director of the Department of Medicine and Surgery, Veterans Administration. Dr. Hawley has an unusually sound concept of the potential of Pharmacy. As a result of this understanding it has been possible to organize a Pharmacy Service in Veterans Administration that I trust will make some contribution to more complete utilization of the services of Pharmacy in hospital operation.

Public Law 293 approved by the President on January 3, 1946, created a Department of Medicine and Surgery in the Veterans Administration, and for the first time provided for the appointment of a Chief Pharmacist.

Functionally, the Pharmacy Service of the Department of Medicine and Surgery was established with the Chief Pharmacist as Director. Organizationally, the Pharmacy Service is divided into a Technical Division and Operations Division, each with a Pharmacist as Chief of Division; the Chief Pharmacist, as Director of Pharmacy Service, with overall responsibility.

The major functions assigned to the Pharmacy Service are: (1) Review and approve all requests for the use of new drugs; (2) approve additions of all drugs to the Veterans Administration supply list; (3) review and effect deletions from existing depot stocks and decentralized contracts; (4) disseminate information on new drugs; (5) review all drug bids; (6) maintain liaison with professional and governmental agencies concerned with operating pharmacy and pharmacology; (7) represent the Veterans Administration in contacts with drug manufacturers and suppliers; (8) develop standards and controls for Veterans Administration pharmacies; (9) supervise the inspection of Veterans Administration pharmacies; (10) establish policy and procedure for control testing of all drugs procured; (11) recommend space and location requirements for Veterans Administration Pharmacies in new construction and alterations; (12) establish policy for Branch Office approval of field station requisitions for narcotics, alcoholics and habit forming drugs; (13) abstract medical literature and maintain a comprehensive reference library on drugs; (14) develop and administer a nation-wide State Pharmacy Service Plan to supplement Veterans Administration facilities; (15) maintain records and statistics on pharmacy services, drug usage and other pertinent, related data.

During the first six months of operation the following objectives have received attention: (1) Advancements in professional status, grade and pay for Veterans Administration Pharmacists; (2) Improvement of operational pharmacy services in Field Stations; (3) Establishment of policy and procedure for the approval of drugs for

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*Presented at American Hospital Association Convention, Pharmacy Section, Philadelphia, October 3, 1946.

W. Paul Briggs

use in Veterans Administration medical activities; and (4) Development of a Pharmacy Service Plan to parallel the State Medical Programs for the care of eligible veterans by private physicians. For convenience, I will briefly describe the progress and current position of these projects in the order enumerated.

(1) PROFESSIONAL STATUS

A survey of pharmacy personnel, libraries and equipment, and prescription services was initiated April 6, 1946. From this survey data were obtained leading to some of the following actions:

Professional grades 3 and 4 were authorized for pharmacists in Veterans Administration as of May 21, 1946. These grades carry salary ranges respectively of $4149 to $4902 and from $4902 to $5905.

Formerly the Pharmacist-in-charge, even in large activities, was limited to grade P-2, and all other pharmacists were limited to grade P-1. Now, in the large stations the Pharmacist-in-charge may be rated P-3 and all qualified pharmacists under his supervision may be rated at grade P-2. Every qualified Veterans Administration pharmacist may be advanced in grade on a professional basis as requirements indicate.

The unfortunate title of "Assistant Pharmacist" has been abolished and in its place the position of Pharmacy Helper has been established, for non-professional personnel.

A Bachelor of Science degree from a school of pharmacy accredited by the American Council on Pharmaceutical Education and current registration are now the minimum professional qualifications for new appointees. Approximately 20 per cent of the present incumbents hold B.S. degrees, and, of course, this percentage will rise as new appointments are made under the new requirements.

It is contemplated that one or more of our major hospitals will be utilized as training centers for pharmacists. It is also planned to provide for refresher courses for some of our key personnel. When present plans are completed pharmacists will be eligible for refresher training in VA teaching centers and in private teaching institutions. All of these plans are being developed with the idea of maintaining the professional capacities of VA pharmacists on a plane comparable to that of physicians and other professional personnel.

(2) OPERATIONAL SERVICES

A minimum library of 12 standard reference books on pharmacy, pharmacology and related subjects and 4 professional journals has been established for all Veterans Administration pharmacies.

This library includes the USP, NF, NNR, Recipe Book, Dispensatory, comprehensive texts on Pharmacy, Pharmacology, Mathematics and Compounding. Also, the Modern Drug Encyclopedia, Merck Manual and Index, and a medical dictionary. The journals supplied our pharmacies include the Scientific and the Practical Pharmacy Editions of the Journal of the American Pharmaceutical Association, the American Professional Pharmacist and, together with the price lists, either Drug Tropics or the American Druggist.

Minimum basic equipment standards have been established and authority granted for the procurement of special pharmacy equipment as indicated by the needs of each activity.

The physical facilities of all Pharmacies are being surveyed. Some will require remodeling and some unsatisfactory locations, within hospitals, will be corrected as general alterations and expansions are made. In new activities larger pharmacies are being provided for and are being located in better positions in relation to parallel professional services.

In each activity station a Committee on Therapeutic Agents has been established. The specified membership of these committees consists of the Clinical Director as Chairman, a member of the Consultant Staff, such other medical and dental personnel as the Manager desires, and a pharmacist as Secretary. This position brings the pharmacist into hospital staff meetings and he is responsible for advising on new drugs, new pharmacy techniques, storage and use of drugs, methods of handling drugs for ward and outpatients and for maintaining a comprehensive reference file on drug therapy for the use of the medical staff.

To illustrate some of the new responsibilities of Veterans Administration Pharmacists, the following is quoted, in part, from the official description of duties as authorized May 29, 1946:

(1) Is personally responsible for storage, issuing, advising medical officers regarding dosage, method of administration, precautions and contra-indications of all drugs authorized for use for investigational or experimental purposes;

(2) Maintains liaison between pharmacy, ward physicians and laboratory with respect to necessary clinical laboratory checks when drugs requiring such control are used;

(3) Abstracts medical and pharmaceutical journals, interviews manufacturer's representatives, maintains current reference file of new developments in drug therapy;

(4) Prepares and distributes to the medical staff technical information on new therapeutic agents, dosage, contra-indications, use, methods of administration, precautions, etc.;

(5) Maintains records on prescribing trends and usage rates of drugs;

(6) Develops special formulas to meet the medication requirements of the medical and dental staff;

(7) Carries out pharmaceutical research to improve usefulness and stability of medicinal preparations manufactured by the Pharmacy.

On July 22, 1946, the official procedure for handling experimental and investigational drugs was announced. Under this procedure the station pharmacist is charged with the personal responsibility of control, storage and maintenance of essential records in connection with such drugs. The pharmacist is required to store such drugs in a locked cabinet clearly marked "NOT FOR GENERAL USE." The Chief Pharmacist has sole access to such drugs and issues them only upon complete prescriptions signed by the using physician or dentist and counter-signed by the Chief Medical Officer or Clinical Director. Such prescriptions must be complete in every detail. In labeling prescriptions the pharmacist is required to include (a) regular serial number (b) date (c) name of drug (d) patient's name (e) complete directions for use (f) physician's or dentist's name (g) the legend "NOT FOR GENERAL USE" and any precautions or warnings that are indicated. When a drug in the investigational stage is authorized for use a clinical report form is supplied to the using activity. The Chief Pharmacist is required to maintain liaison with the physicians, laboratories and other services in connection with the controls required in using such drugs. Records are kept in a stitched book in which full information on the product is given, including the date, source, and amount of drug obtained as well as prescriptions dispensed and the initials of the compounding pharmacist. These record books are retained for a period of two years and the record of the use of drugs under investigation is closed by a final entry indicating approval for general use or discontinuing use based on clinical findings.

Pharmacy divisions in each of the 13 Veterans Administration Branch Offices were authorized May 21, 1946, with a Pharmacist P-4 as Chief of Division and a Pharmacist P-3 as Assistant Chief. The Branch Pharmacy Division will have administrative and supervisory functions similar to those described for the Central Office Pharmacy Service, except basic policy and approval of drugs.

(3) DRUG POLICY AND PROCEDURE

By announcement, dated May 28, 1946, the Pharmacy Service was made responsible for the approval of all drugs used in Veterans Administration. A procedure has been developed to ac-

complish this which, it is believed, is sound for Veterans Administration and convenient to manufacturers. Briefly, all drugs, after approval for use, are procured (1) on Veterans Administration specification for depot stock or (2) on the manufacturer's specification, for decentralized contract. The former status is self-explanatory; the latter involves an open contract negotiated in Washington but decentralized for ordering purposes to each Field Station. In general, depot stocks comprise official and non-branded drugs. Decentralized contract items are mainly ethical specialities.

If physicians in field stations are interested in any drug product, they are invited to so inform the Chief Medical Director. When a significant number of such requests are received, and when manufacturers have supplied the Pharmacy Service with technical and professional data on the drug, consideration is given to placement of the product upon decentralized contract. If such contract is made, the product is then available to all Veterans Administration Field Stations as orders from physicians warrant.

General Hawley has said that Veterans Administration patients are not to be used as "guinea pigs" for purposes of drug experimentation, but this does not mean stifling of research or progressive therapy. As previously stated, drugs in the investigational stage of development may be used if properly recommended by the station Committee on Therapeutic Agents and considered appropriate by the Central Office Executive Committee on Therapeutic Agents, of which the Director of Pharmacy Service is Secretary.

(4) PHARMACY SERVICE PLAN

VA plans for over-all pharmacy service include participation, by private pharmacies, through State Pharmaceutical Associations as a parallel service to state-wide Medical Society care to veterans with service-connected disabilities.

A plan, approved by Veterans Administration, was offered to all State Pharmaceutical Associations in June of this year. As of October 1, 1946, 41 States and the District of Columbia had accepted this uniform Agreement. Of these, 40 have been signed by Veterans Administration and returned to the States to be placed into immediate operation.

Oversimplified, the Agreement between the State Pharmaceutical Association and Veterans Administration provides for the filling of prescriptions of designated and fee basis physicians for eligible veterans, by participating pharmacy members. This is Pharmacy's part in the so-called "home town" medical care of veterans. It is designed to provide prompt and efficient medication as required and as prescribed by private physicians cooperating with and supplementing organized Veterans Administration medical facilities. Physicians have absolute freedom of choice as to drugs prescribed. The Association bills Veterans Administration for the total value of such pharmacy services on a monthly basis. Veterans Administration remits the amount of such services to the Association which in turn pays the participating member pharmacy. Fees for prescriptions are based on a schedule which I developed in 1939 and published in the Journal of the American Pharmaceutical Association in 1940 and which are comparable to prevailing fees for regular prescription services.

I do not know how the plan will develop and I cannot estimate the potential. I do know that the plan is acceptable to the medical profession and the operation of the plan, where pharmacy and medicine are coordinated, certainly will receive the approval of the veterans. Many procedures and operational details remain to be spelled out. General Hawley, in a letter announcing the Pharmacy Plan to all Branch Medical Directors, said, "This is a major undertaking which will require adjustments and cooperation but which, when fully operative, should greatly improve this phase of our service to veterans." That statement is all that can be said regarding the future of the program at this stage of development.

In my judgment, Pharmacy in Veterans Administration enjoys respect from all quarters and abundant opportunity to demonstrate its capacity for professional service. A sound working basis for Pharmacy service has been provided. Very properly, Veterans Administration now expects in return outstanding professional service from Pharmacy as its contribution to the very necessary, best conceived and most extensive medical program in history. I am confident that pharmacists, in service and in private practice, will meet their full professional obligation under the new VA Medical Program.

Therapeutic Trends

Some Recent Trends in Pharmacy and Medicine Include GLUTAMIC ACID USED TO IMPROVE BRAIN FUNCTION - HYDROSULPHOSUL - COLISTATIN - ERYTHRIN - USE OF DIAMIDINES IN CHEMOTHERAPY - CYTOCHROME C.

GLUTAMIC ACID USED TO IMPROVE BRAIN FUNCTION

Natural occurring glutamic acid is believed to have a close direct or indirect relationship to brain metabolism. Preliminary studies in which glutamic acid was administered to subjects with secondary mental deficiency were reported in the Journal of Nervous and Mental Diseases (September 1946). In a series of studies conducted three years ago in which l-glutamic acid was used to treat patients suffering from petit mal epilepsy, it was noted that mental and physical alertness of patients was increased. However, the degree of improvement could not be correlated with the incidence of seizures. As a result of these studies glutamic acid was used experimentally on rats to determine the possibility of its use to improve brain function. More recent studies on human subjects showed a significant rise of mental age during administration of glutamic acid. During the successive placebo period the patients' IQ dropped back to the level maintained before glutamic acid was administered. Though a limited influence can be demonstrated on some patients, this possibility of improving brain function by biochemical means is a starting point for further investigation in this field.

HYDROSULPHOSUL

Hydrosulphosul, an epithelial stimulant containing sulfhydryl pentathionate has been reported in the Journal of Surgery (October, 1946), to possess certain advantages in the treatment of burns. Used in a series of more than 500 burn cases, hydrosulphosul proved advantageous over other methods used. X-ray burns in which devitalized or ulcerated condition and infection were present healed with lack of scarring and absence of infection and there was less chance of development of symblepharon.

Hydrosulphosul presents sulfur in a form that can be utilized by the body in the synthesis of sulfur-containing amino acids. When the solution is used on an injured area such as a burn, a coating is formed by depositing a thin layer of sulfur or calcium. It is believed that sulfhydryl or sulfur in some form is absorbed by the body during the process of establishing this coating.

Especially valuable in the treatment of eye burns, hydrosulphosul is used as drops in the eye in a dilution of 1:40 in warm triple distilled water. Drops are instilled into the eye at intervals of thirty minutes or up to two-hour intervals according to the extent of injury and progress of healing. A 1:20 dilution is used as compresses on the outside of closed eye lids. By evaporating the solution to constant weight, a concentrate is obtained which can be combined with a suitable cold cream base and used successfully in conjunction with the solution as a satisfactory aid to healing processes on areas outside of eye where use of an ointment is indicated.

In addition to its used as a treatment for burns, this product has been used in conjunction with penicillin in the treatment of multiple corneal ulcers with results not heretofore observed when using penicillin alone.

No contraindications have been observed for hydrosulphosul when used with other medicaments. Also, there has been no evidence of any toxic reactions following free and repeated application of this sulfhydryl-bearing solution. Additional study will be needed to confirm various aspects of using hydrosulphosul in this manner.

Hydrosulphosul is available in a solution for oral administration or topical application in one, four and eight ounce bottles from Rees-Davis Company, Meriden, Conn. An ointment for topical application is also available in one ounce and one pound jars.

COLISTATIN

Colistatin, so-called because of its bacteriostatic action upon Bacterium coli, is a new antibiotic believed to have chemotherapeutic properties. Science (September 27, 1946) reports that colistatin has some features like streptomycin though it possesses a bacteriostatic action only, and is devoid of bactericidal power. It is produced from an aerobic bacillus found in chernozem soils.

Colistatin inhibits the growth of staphylococci, pneumococci, B. coli, B. proteus, B. paratyphosus B., B. dysenteriae Shiga, and B. typhi abdominalis. In the experimental studies a concentrated aqueous solution of colistatin was given to white mice by subcutaneous, intramuscular, or intravenous injections at a concentration of 100,000 units/kg. without toxic reactions.

ERYTHRIN

Erythrin is a new antibiotic which has been shown to be effective against diphtheria. Obtained from the red blood cells of rabbits, this is the first time such a substance has been extracted from higher animals. Erythrin has also been obtained from other animals such as guinea pigs and white rats but it has been found that which is obtained from rabbits is most effective. Clinical trials using this new antibiotic against diphtheria and other diseases are being carried out in Moscow according to a report in Science News Letter (November 9, 1946)

USE OF DIAMIDINES IN CHEMOTHERAPY

In a recent study to determine the value of diamidines in the treatment of leishmaniasis and tryanosomiasis, a large number of new compounds including alkyl and alkylene-amines, amides, isothioureas and guanidines, were synthesized. Reported in Annals of Internal Medicine (November, 1946), three compounds were found to be especially satisfactory in the laboratory treatment of experimental protozoal infections. These compounds included stilbamidine, pentamidine and propamidine.

Both stilbamidine and pentamidine were given to patients with leishmaniasis with favorable results, though stilbamidine appeared to be more effective than pentamidine. Experimental studies also indicate that stilbamidine is effective in the treatment of trypanosomiasis in the early phases of the disease but less potent in the later stages.

Used in the treatment of infections of surface wounds such as burned surfaces and in wounds associated with plastic surgery, the diamidines were shown to possess bactericidal power against streptococci and staphylcocci organisms.

Doses exceeding one milligram per kilogram of body weight resulted in flushing of the face, epigastric discomfort, headache, a rapid pulse, sweating, retching and occasionally vomiting in some patients. However, the symptoms passed within half an hour and often failed to reappear after the second or third injection. Although these drugs appear to be relatively safe, occasional fatalities have occurred.

CYTOCHROME C

Cytochrome C, a chemical normally present in all living tissues, has been used experimentally to combat tissue anoxia according to Science (October 25). Obtained from beef heart, cytochrome is a protein which is apparently non antigenic, nontoxic, and stable. Injections of this chemical were found effective in improving the efficiency of oxygen utilization in the tissues under conditions of anoxia. Diseases in which anoxia, acute or chronic, is thought to play a role may be relieved by injection of cytochrome C. Included in the diseases in which preliminary observations have been made are Raynaud's disease, pulmonary emphysema, hemorrhagic shock and certain cerebral dysfunctions. Future study for other possible uses of cytochrome C include those degenerative diseases associated with arteriosclerosis in which mild chronic anoxia may be a significant factor.

CURRENT LITERATURE

HOSPITAL MANAGEMENT

October 1946 - "Hospital Pharmacists to Learn Place In Medical Care Picture" - A resume of the Pittsburgh meeting of the American Society of Hospital Pharmacists. Page 88.

"Vastly Improved Pharmacies Seen For V.A. Hospitals"-Article lists official duties of pharmacists in V.A. Page 92.

November 1946 - "Preparing Narcotics in Solution is Opposed by Majority" by Kenneth A. Brent. - A discussion of the results of a survey on the pros and cons of preparing narcotics in solution. Page 86.

HOSPITALS

October 1946 - "Medications For Outpatients - Accounting and Legal Requirements" by Donald A. Clarke, apothecary-in-chief, New York Hospital - Part two of a series. A discussion of accounting, legal requirements, labeling, refilling prescriptions and other phases of the efficient management of an outpatient department. Page 60.

November 1946 - "Narcotics, Hospitals Legal And Moral Responsibilities" by J. R. McGibony, M.D. Senior Surgeon, Hospital Facilities Section, U.S.P.H.S. - A review of the Harrison narcotic law and its application to hospitals. Narcotic records and prescriptions, the role of the hospital pharmacist, nurse, intern, resident and physicians in the handling of narcotics is discussed. Page 59.

MODERN HOSPITAL

October 1946 - "Detoxification With Sulfhydryl Compounds" Notes and abstracts concerning the mechanism of action of Dimercaprol, prepared by the Committee on Pharmacy and Therapeutics, University of Illinois College of Medicine. Page 92.

November 1946 - "The Present Status of Germicides" - The changing concept of the use of germicides discussed by the Committee on Pharmacy and Therapeutics of the University of Illinois College of Medicine. Page 94.

SOUTHERN HOSPITALS

October 1946 - "With The Hospital Pharmacist" - edited by D. O. McClusky, Jr. "Minimum Equipment for the Hospital Pharmacy" and other items of interest to the hospital pharmacist. Page 70.

November 1946 -"With The Hospital Pharmacist" edited by D. O. McClusky, Jr. - A summary of Pharmacy Section meeting of the A.H.A. convention in Philadelphia. Page 64.

"The Rise of the Hospital Pharmacist" by William Levin, chief pharmacist, Philadelphia General Hospital. Page 66.

AMERICAN PROFESSIONAL PHARMACIST

September 1946 - "Sterile Medications In The Hospital Pharmacy" by Ann P. Godley and Leo F. Godley, pharmacists, N.Y. University Medical College Clinic. - The preparation of various sterile solutions and the equipment required is discussed. Page 854.

October 1946 - "Hospital Pharmacy And The Profession" by Curt P. Wimmer, Phar. D. - The role of the progressive hospital pharmacist is discussed. Page 952.

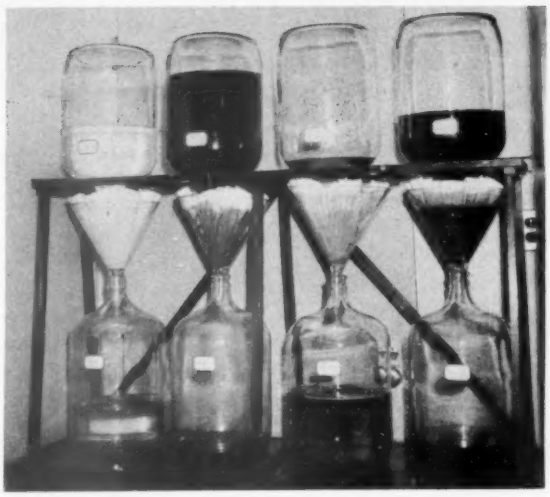
November 1946 - "So You Want To Be Chief"-A well written article commenting on the opportunities and the problems of a chief pharmacist. Page 1054.

A.Ph.A., PRACTICAL EDITION JOURNAL

October 1946 - "1946 Meeting A.S.H.P." "Hospital Queries" a new column edited by John J. Zugich, chief pharmacist, Grace-New Haven Hospital, New Haven, Conn. Page 458.

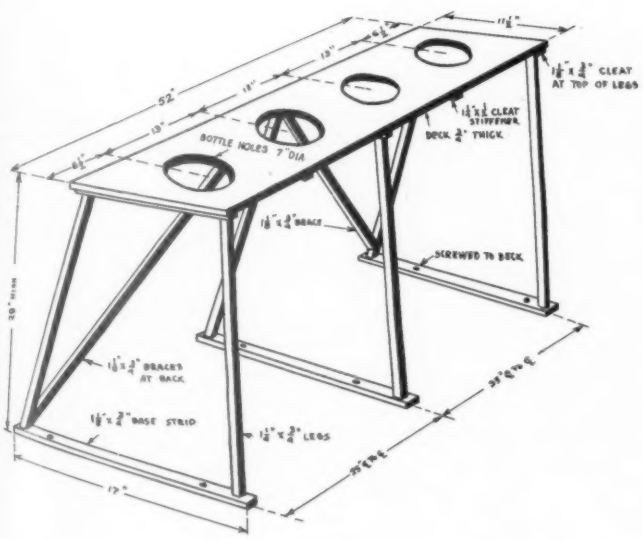
November 1946 - "Surveying The Survey" by Leo F. Godley. A discussion of the Pharmaceutical Survey being conducted by the American Council on Education. Page 511.

"Midwest Hospital Pharmacy" by Wilma K. Maus, chief pharmacist, Mercy Hospital, Council Bluffs, Iowa. Page 513.



AUTOMATIC OPEN FILTER BEDS

By Elinor Zola* and
George F. Archambault**



One of the evil spots in many well-conducted and regulated hospital pharmacies is found in and around the filtering beds. Many a pharmacist has felt that, because this operation often tends to produce an unsightly condition when conducted by untrained personnel, such beds should be kept in closed or out-of-the-way areas. In some instances, special filtering closets have been built, with the mentioned object of being dust-free, but the pharmacists involved frankly admit that the careless filtering technique of personnel has contributed mostly to the building of such units. It has been our observation that closet-type filters have made bad conditions worse and that in many instances the condition is not corrected.

The automatic, self-filtering, open filter beds illustrated here were designed to create a definite home for filtering operations involving five-gallon lots of stock solutions. The thought was to create a spot that would be a pharmacy attraction, rather than the customary eyesore. The beds have been in operation for several years, countless gallons of Elixir Phenobarbital, Elixir Terpin Hydrate, and other common hospital-used solutions requiring filtration have passed through these filters monthly. The economy and simplicity of the beds, plus the use of but eight five-gallon carboys and four half-gallon funnels to complete the set, constitute one of its main attributes.

The very fact that the beds are entirely open and visible has insured cleanliness of operation. Since their adoption, untidiness and sloppy technique have disappeared. The personnel takes pride in keeping the beds "show spots" in their pharmacy. Physicians, spotting the automatic filtering process, often pause to comment on the brilliance and sparkle of the galenicals.

It is truly said that in all pursuits merchandising or showmanship should be used in selling ideas. The utilization of an open filter bed of this type for the 300 to 400-bed hospital pays real dividends in teaching cleanliness and pride of technique to non-professional personnel, as well as serving as an aid for better pharmacy.

*Chief Pharmacist--United States Marine Hospital, Boston U.S.P.H.S.
**Former Chief Pharmacist--United States Marine Hospital, Boston, U.S P.H.S. Member of Faculty, Mass. College of Pharmacy.

EDDIE WOLFE
CHIEF PHARMACIST

MT. ALTO VETERAN'S HOSPITAL
2650 WISCONSIN AVENUE, N. W.
WASHINGTON 7, D. C.

January 2, 1947

Fellow V.A. Pharmacists:

The responses to my first letter to all V.A. Pharmacists have been very encouraging. Start the New Year right and mail in your application blanks now.

We feel sure that all V.A. Pharmacists will finally establish a common meeting ground in these pages. It is also our opinion that with a representative number of our V.A. Pharmacists as members of the ASHP, we shall justify the space made available to us by the Society. With your help we can present solutions to problems in Hospital Pharmacy and mediums of improving ourselves professionally in conjunction with bettering our professional Pharmacy Service.

We are sure that all V.A. Pharmacists will agree that membership in the ASHP and APHA will advance the professional prestige of each of us as Professional Hospital Pharmacists.

Very truly yours,

Eddie Wolfe

Eddie Wolfe

THE VETERANS ADMINISTRATION PHARMACIST

V.A. PHARMACISTS - Beginning with the January-February issue of this publication these pages are YOUR pages. We need your contributions to make this part of the BULLETIN informative and valuable. Any article on Pharmacy in the Veterans Administration which will be of interest to V.A. Pharmacists will be considered for publication. However, the limited space available may necessitate some editing of articles.

May I suggest the following type of material for publication in this column--unusual solutions to common problems...new ideas on manufacturing and dispensing procedures ... experimental theories that have been carried out successfully in the hospital by your staff...amusing anecdotes about your Pharmacy...pictures of new equipment you have devised...pictures of your department and staff.

The success of YOUR column depends on YOU. Help to make the V.A. pages valuable to you and other V.A. Pharmacists. Mail all photographs, articles and suggestions to: Eddie Wolfe, Chief Pharmacist, Mt. Alto Veterans Hospital, 2650 Wisconsin Ave., N.W., Washington 7, D.C.

YOUR V.A. EDITOR

Mr. Wolfe was graduated from the George Washington University School of Pharmacy, class of 1937, with a B.S. degree. Directly from school he was appointed as Pharmacist for the U.S. Public Health Service Dispensary in Washington, D.C. After five years at this position he enlisted in the U.S. Coast Guard. His duties were, in part: Chief Pharmacist's Mate aboard the Patrol Frigate U.S.S. Poughkeepsie; instructor in First Aid and sick bay procedures to recruits and personnel at a Coast Guard Training Station; after eight months of teaching, he was transferred to duty aboard a subchaser for Air-Sea Rescue detail.

Discharged from the U. S. Coast Guard after a duty of over three years, Mr. Wolfe returned to the U.S. Public Health Service. He resigned after a month to accept his present position with the Veterans' Administration as Chief Pharmacist at the Mt. Alto Veterans' Hospital in Washington, D.C.

An example of the type of suggestion we would like the V.A. Pharmacists to submit for publication is as follows:

"An 'Emergency Drug Cabinet' is shown in the picture. The cabinet should be placed in a conspicuous position in the Pharmacy. The purpose of the cabinet is to have available any emergency drugs that may not be on the wards when needed after the Pharmacy is closed. The simple procedure is for the doctor to unlock the Pharmacy and go directly to the cabinet to select the necessary emergency drug.

"The following drugs were selected for their apparent emergency uses."

DIGOXIN	PROSTIGMINE
DIGIFOLINE	SODIUM AMYTAL
CORAMINE	EMETINE
AMINOPHYLLIN	BAL IN OIL
MERCUPURIN	BENZEDRINE
SODIUM SULFADIAZINE	PICROTOXIN
GYNERGEN	DEXTROSE
ADRENALIN 1-100	DISTILLED WATER
ADRENALIN IN OIL 1-500	LACTATE RINGERS SOL.
ADRENALIN 1-1000	SODIUM CHLORIDE ISOTONIC
ATABRINE	

NEWS ITEMS

Sylvester H. Dretzka

A. J. Affleck

R. L. Sanford

B. V. Christensen

H. A. B. Dunning

G. A. Moulton

A.Ph.A. ANNOUNCES ELECTION RESULTS

The results of the recent election of officers of the American Pharmaceutical Association have been announced. The election resulted as follows:

President-Elect
Sylvester H. Dretzka, Milwaukee, Wisconsin

First Vice President-Elect
Augustus J. Affleck, Sacramento, California

Second Vice President-Elect
Roy L. Sanford, Enid, Oklahoma

Members-Elect of the Council (3 years)
Bernard V. Christensen, Columbus, Ohio
H.A.B. Dunning, Baltimore, Maryland
George A. Moulton, Petersborough, N.H.

The officers elected will be installed at the annual convention to be held in Milwaukee the week of August 24, 1947.

The present officers of the American Pharmaceutical Association who will continue to serve until the Milwaukee Convention are: President Earl R. Serles, Chicago; First Vice President A. Lee Adams, Glencoe, Ill.; Second Vice President Harold V. Darnell, Indianapolis, Indiana. The Secretary and Treasurer are elected by the House of Delegates.

Robert P. Fischelis holds the office of secretary, while Hugo H. Schaefer is treasurer.

STIMSON REPRESENTS A.S.H.P. AT AMERICAN COLLEGE SURGEONS MEETING

Mr. Russel Stimson, chief pharmacist at the Huron Road Hospital, Cleveland, spoke to the administrators at the recent meeting of the American College of Surgeons in Cleveland. His topic was "Hospital Pharmacy."

PRESIDENT N.Y. STATE BOARD PHARMACY ADDRESSES HOSPITAL PHARMACISTS

Pointing out that the hospital pharmacist is the show-case of pharmacy and declaring that the hospital pharmacist has done a great deal to elevate the profession of pharmacy, Robert

R. Gerstner, president of the New York State Board of Pharmacy speaking before the Society of Hospital Pharmacists of New York urged hospital pharmacists to insist on raising drug standards in those hospitals where such a need exists.

Mr. Gerstner said that the colleges of pharmacy have been neglectful in not including courses in hospital pharmacy in their curriculum. He urged that refresher courses in hospital pharmacy be established and that these courses be given by those with experience in the field.

During the meeting, Morris Dauer, president of the Society of Hospital Pharmacists of New York, revealed the society is working toward affiliation with the American Society of Hospital Pharmacists.

McCLUSKY APPOINTED ADMINISTRATOR

D. O. McClusky, Jr., formerly assistant administrator and chief pharmacist at South Highland Infirmary, Birmingham, has been appointed administrator of Druid City Hospital, Tuscaloosa, Alabama. Mr. McClusky has also been asked to participate on the program of the Southeastern Hospital Conference, the meeting to be held in Biloxi, Mississippi in April. His subject will be "The Pharmacy as a Professional Service Department."

THE GREATER NEW YORK CHAPTER of the American Society of Hospital Pharmacists is conducting a survey to determine the benefits of various arrangements of the medicine cabinets in the hospital nursing units.

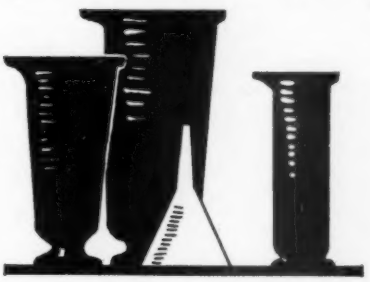
FLACK APPOINTED HOSPITAL PHARMACY EDITOR OF AMERICAN PROFESSIONAL PHARMACIST

Herbert L. Flack, chief pharmacist of the Jefferson Medical College Hospital, Philadelphia has been appointed editor of the Hospital Pharmacy Forum of the American Professional Pharmacist. Mr. Flack, a graduate of the Philadelphia College of Pharmacy and Sciences, is a career hospital pharmacist having served a period of internship under Donald A. Clarke at The New York Hospital. During the war Mr. Flack served with the U.S. Army Medical Department in the Pacific and Japan. Mr. Flack is also a member of the Program committee and is an alternate to the House of Delegates for the A.S.H.P.

"WHO FILLS PRESCRIPTIONS IN HOSPITAL PHARMACIES" is the title of a thought provoking article by Irving Rubin, associate editor, in the December 1946 American Druggist.

ZUGICH NOMINATED FOR A.S.H.P. CHAIRMANSHIP

Replacing Donald A. Clarke, apothecary-in-chief of The New York Hospital who has withdrawn from the chairmanship race because of the press of other activities will be John J. Zugich, chief pharmacist of the Grace-New Haven Hospital, New Haven, Connecticut. Mr. Zugich was nominated by the Executive committee of the Society under its interim powers. The other nominee for the chairman position is W. Arthur Purdum, chief Pharmacist at the Johns Hopkins Hospital, Baltimore. The ballots, which are now being printed for distribution to dues-payed active members, have been delayed because of A.S.H.P. reorganization procedures. Ballots will be mailed to the membership in the near future.



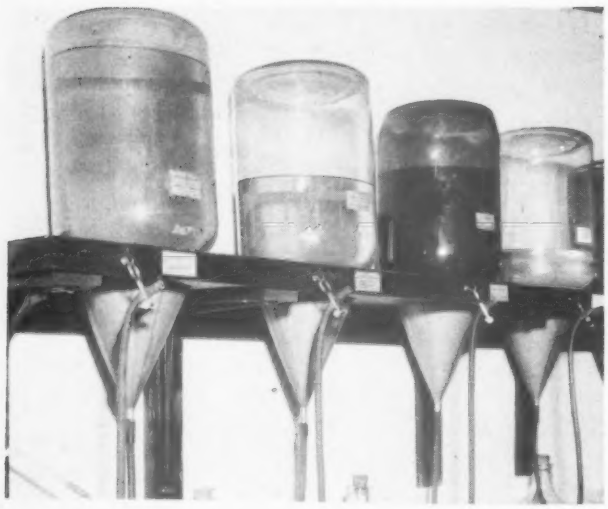
1947 CERTIFICATES NOW BEING SENT

1947 certificates are now being mailed to those members who joined the Society after August 26, 1946 and are thus considered as having their dues paid through 1947. Other members of the Society will receive their 1947 certificates upon the receipt of their 1947 dues.

NOTES *and*

By Grover C. Bowles
University Hospital
Ann Arbor, Michigan

BOTTLE FILLING DEVICE



This bottle filling device conserves space, saves time, and eliminates much of the waste commonly encountered in the daily routine filling of ward stock bottles. The illustrated apparatus is a sturdily constructed shelf, 12 feet long, 14 inches wide and 2 inches thick. The shelf is mounted 5 feet above the floor and accommodates nine 5-gallon bottles. The bottles are inverted in a circular opening 9 inches in diameter and fitted with a metal funnel. A 4-foot length of rubber tubing is attached to the funnel and the flow of the solution is controlled by a pinch-clamp. Refilling ward stock bottles by this method is of particular advantage when working with such solutions as mercury oxycyanide, denatured alcohol, Benedict's solution, propanol, and other commonly used solutions.

HAND LOTION

An inexpensive hand lotion of unusual quality and stability may be prepared by the following formula:

Sodium Alginate*	2.5 Gm.
Distilled water	850.0 Gm.
Cetyl Alcohol	5.0 Gm.
Triethanolamine	5.0 Gm.
Stearic Acid	50.0 Gm.
Wool Fat	10.0 Gm.
Alcohol	100.0 Gm.
Perfume	1.0 Gm.
Methyl Parasept	1.0 Gm.
To make approximately	1000.0 CC

*May be obtained from the Kelco Company, 75 E. Wacker Drive, Chicago.

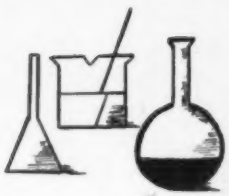
Procedure: Heat the water to boiling and add the sodium alginate slowly with constant stirring until dissolved. Allow this mucilage to cool to 65°C, then add the triethanolamine. Melt the cetyl alcohol, stearic acid and wool fat and then cool to 65°C. Add this mixture to the mucilage. Emulsify by continuous stirring, avoiding the incorporation of air. When the mixture is at room temperature slowly add the perfume and methyl parasept which has been dissolved in the alcohol.

The lotion is quite thick when first prepared but thins out upon standing. Allow the lotion to age for two or three weeks with occasional shaking. If a lotion of the "Honey-Almond" type is desired, 0.5 per cent honey may be added to the aqueous phase and 0.2 per cent benzaldehyde dissolved in the alcohol.

PROPYLENE GLYCOL

Because of the recent shortage and the high price of glycerin, hospital pharmacists will be interested in knowing that propylene glycol may be used in place of glycerin in most external preparations and in some for internal use. Propylene glycol is an excellent preservative and mold inhibitor, being considered by many superior to glycerin for these purposes. It is also recognized as an excellent solvent and emollient. Information concerning the use of propylene glycol in internal preparations may be found in the Journal of the A.Ph.A., Practical Edition, 4: 384 (December) 1943. Propylene glycol is made by the Dow Chemical Company, Midland, Michigan and by the Carbon and Carbide Corporation, 30

SUGGESTIONS



E. 42nd St. N.Y.C. Write to these companies for a free brochure on the uses of propylene glycol and the name of a local supplier.

DEODORANT AND ANTIPERSPIRANT CREAM

An effective, non-irritating deodorant cream may be prepared by the following formula:

Glyceryl Monostearate (acid emulsifying)*	150.0 Gm.
Propylene Glycol	30.0 CC.
Spermaceti	50.0 Gm.
Methyl Parasept	1.0 Gm.
Distilled Water	550.0 CC.
Titanium Dioxide	20.0 Gm.
Aluminum Sulfocarbolate	150.0 Gm.
Boric Acid Powder	50.0 Gm.
To make approximately	1000.0 Gm.

*Tegacid, may be obtained from the Goldschmidt Corporation, 147 Waverly Place, New York City.

Heat the acid glyceryl monostearate, propylene glycol, spermaceti, methyl parasept and distilled water together, gradually raising the temperature, not exceeding 85°C, until all ingredients are melted. Stir until cool. Add the titanium dioxide, aluminum sulfocarbolate and the boric acid. Mix thoroughly on an ointment slab. Allow the ointment to stand over night before milling.

DEODORANT BLOCKS

Para dichlorobenzene is often used in the wash-rooms of hospitals and other institutions as a deodorizer. This chemical may be prepared in a form suitable for use employing the illustrated biscuit trays. The trays are first filled with large granules of para dichlorobenzene. Some of the chemical is then melted in a separate container on a hot plate. The melted para dichlorobenzene is then poured over the granules contained in the trays. Upon cooling, a block of solid deodorant will be formed. This may be removed from the tray be inverting the container and tapping the bottom.

POSITIONS

The Springfield Hospital, Springfield 7, Massachusetts has an opening for a hospital pharmacist. It is a 285 bed hospital with a normal staff of three pharmacists. The salary starts at $135 per month with maintenance of room, board, and laundry. Write to Esther I. Clark, Chief pharmacist, for further information.

The Holzer Hospital, Gallipolis, Ohio has an opening for a pharmacist. This is a 75 bed hospital with a very busy service, and a large out-patient department. Two full-time pharmacists are employed, together with an assistant. Beginning salary $225.00 with an increase to $250.00 in six months. Interview will be financed by the hospital after preliminary correspondence has indicated that the association will probably be mutually beneficial. For additional information communicate with Dr. Charles E. Holzer, The Holzer Hospital, Gallipolis, Ohio.

WETTING AGENTS and their pharmaceutical applications

by

SISTER MARY ETHELREDA DODA

INTRODUCTION

Interest in organic compounds which possess surface activity has greatly increased during the past ten years. Industry has recognized the importance of this aspect of chemistry, especially in respect to its aqueous processes, and of the advantages gained by the use of these polar surface-active compounds. That this interest is now greater than ever before is evidenced by the numerous industries using these compounds as wetting agents and penetrants, as also, by the enormous amount of literature available on the subject.

Lenher[1] has assembled a list of already established commercial uses of wetting agents. To cite but a few - in the textile, fur, petroleum, paper, paint, cosmetic, and rubber industries; leather manufacture, metal processing, agricultural uses, etc. - would be illustrative of the multiplicity of uses and would point toward the trend of ever expanding applications.

It is the purpose of this paper to concentrate upon but one phase of the varied applications - Pharmaceutical. This specialized and isolated field will have its major interest especially in the possibilities on the part of the dermatologist, the dentist, in use as and with antiseptics, and as a soap substitute.

PHENOMENON OF WETTING

Toward a more thorough understanding of the mechanism of surface wetting, it becomes necessary to elucidate a few important terms and phenomena.

(a) Surface Tension

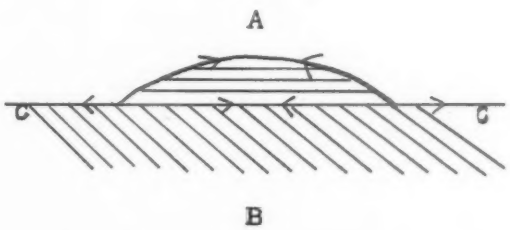
Molecules of a liquid are in constant movement and are held together by strong cohesive forces. In the interior of the liquid these forces act in all directions and balance one another. However, a molecule near a boundary will experience an inward pull since the attraction of the forces of the molecules of the external phase are, in general, less than the cohesive forces acting between like molecules. In order to extend the surface, additional molecules must be brought from the main body of the liquid. In this process work is done against the cohesion of the liquid, and energy is stored in the molecules which are moved to the surface. This "surface free energy" has been termed specifically "surface tension" when it refers to a gas-liquid boundary or "interfacial energy," when it refers to a liquid-liquid boundary.[2] It has the unit of dynes per centimeter.

(b) Wetting

The operation of wetting may be broadly defined as the ability of a liquid to form a continuous film upon the surface of a solid or on that of another liquid.

If a drop of water is placed upon a clean solid surface, whether it will spread, or maintain its globular form is dependant upon the relative values of the three surface tensions, as shown in Figure I.

FIGURE I



The surface tension of the water T_1 will be exerted toward A so as to maintain its globular form. The surface tension of the solid T_2 will

*Submitted in partial fulfillment of the requirements for the Degree of Master of Science, Department of Pharmacy, Western Reserve University.

[1]Lenher, Samuel, "The Expanding Applications of Wetting Agents," Chem. Industries, 48, 324-6 (1941)

[2]Hauser, E.A., Andrear, J.M., Tucker, W.B., "Importance of Boundary Energy Measurements in Industry," Ind. Eng. Chem., 31, 32-35 (1939)

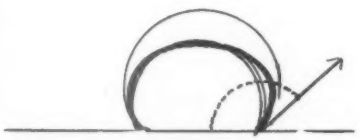
be toward C tending to draw out the drop to form a film. The interfacial tension T_{12} will be toward B striving to roll up the drop. Wetting or film formation results when the surface tension of the solid T_2 is greater than the sum of the other two, that is, $T_2 > T_1 + T_{12}$.[3]

"Surface active agents are generally defined as substances which when added to a liquid will lower the interfacial tension at the boundary of this liquid. The boundary may be between the liquid and air, the liquid and another liquid, or the liquid and a solid."[4] Hence, the lower the value of T_{12}, the greater the wetting. The interfacial tension should be as low as possible approaching zero as the limiting value.

(c) Contact Angle

If a solid does not adsorb a liquid sufficiently to displace the film of air or other foreign substance on the surface, there will be an angle of contact between the liquid and the solid. As indicated in Figure II, for complete wetting, the contact angle is zero; for no wetting, the contact angle is 180°; and for partial wetting, the contact angle is some value between the two extremes.[5]

FIGURE II



Contact angle between 90° and 180°

Contact angle 90°

Contact angle between 0° and 90°

(d) Types of Wetting

Bartell and Osterhof[5] describe three types of wetting:

1. Adhesional Wetting - in which a plane solid surface of unit area is brought into contact with unit parallel surface of liquid. Surface energy aids in the process. Liquids of highest surface tension will have the highest adhesional wetting. This type of wetting is positive when the contact angle is less than 180°. Accordingly, it should follow that any liquid will tend to wet a solid if the two are properly brought together.

2. Spreading Wetting - a drop spreads over the plane surface of a solid. Liquids of lowest surface tension will wet the solid more readily and with less expenditure of energy than liquids of high surface tension. Spreading wetting is positive when the angle of contact is 0°, and it is negative for all larger values. If spreading is not positive the liquid will form a definite angle of contact with the solid when at equilibrium.

3. Immersional Wetting - a solid surface is immersed in a liquid. The surface energy of the liquid system remains unaltered, since a solid-liquid interface has been substituted for a solid-air interface. Immersional wetting is positive when the angle of contact is 90° or less, and is negative when the contact angle is greater than 90°.

(e) Orientation

Langmuir[6] and others showed that if a minute quantity of fatty acid is placed on a water surface under suitable conditions it spreads as a monomolecular layer. This is due to the active-COOH group which combines, by secondary valence, with water; the remainder of the molecule being tilted so that the chain becomes perpendicular to the surface of the water. The thickness of the oil film increases with the number of carbon atoms in the chain while the area per molecule remains the same. Since the molecular cross section was found to be independent of the chain length, it was concluded that the molecules were standing on end with the weak hydrophylic-COOH group oriented toward the water while the hydrophobic groups extend above the surface.

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[3]Nuttall, W.H., "Wetting Ability and Its Relation to Industry," J. Soc. Dyers Colorist, 40, 104-11 (1924)

[4]Bartell, F.E., "Wetting Agents," Ind. Eng. Chem., 33, 737 (1941)

[5]Bartell, F.E., Osterhof, H.J., "Three Fundamental Types of Wetting: Adhesion Tension as the Measure of Degree of Wetting," J. Phys. Chem., 34, 1399-1411 (1930)

[6]Langmuir, Irving, "The Constitution and Fundamental Properties of Solids and Liquids," Jour. Amer. Chem. Soc., 38, 2221-95 (1916); 39, 1848-1906 (1917)

EVALUATION OF WETTING AGENTS

The accepted means of evaluating the wetting properties of a surface active compound is the "Draves and Clarkson Wetting Speed Test."[7] Although this by no means will definitely prove the usefulness of the surface active compound in any particular application, it does give a general evaluation of the activity and effectiveness of the agent under test. The Draves test consists of measuring the time necessary for 5 gram skeins of unboiled, two-ply cotton yarn to sink in 500 cc. of the solution under test, when the skein is weighted down with a 3 gram hook attached to a 40 gram weight. If necessary the test is carried out also in the presence of acids, alkalis, hard water or at elevated temperature.

Another method of evaluation is that of the spreading coefficient. Since it is possible to determine the surface tension as well as the interfacial tension values for various liquids, the spreading coefficient can be easily calculated. It is a measure of the spreading power of a solution of a wetting agent on an oily surface employed as a standard, and is equal to the surface tension of the oil less the sum of the surface tension and interfacial tensions. The greater the algebraic value (more positive) the greater the spreading power.[8] However, suitable methods are not available for the measurement of the interfacial tension of the systems gas-solid, liquid-solid, or solid-solid. Changes occurring in the free energy at solid interfaces have been determined by measuring the adhesion tension of liquid-solid systems. This determination involves the measurement of the angle of contact. Bartell[9] presents a very thorough and comprehensive explanation of this procedure. In this connection, it may briefly be stated that "adhesion tension" is the difference between the surface tension of the solid and its interfacial tension against a liquid:

$$A = \gamma_s - \gamma_{sl}$$

The greater the attraction of the solid, the smaller will be A. A is equal to the work done when a liquid-solid interface is substituted for a vapor-solid interface, and is, therefore, a direct measure of wet ability.

THE CHEMISTRY OF WETTING AGENTS

I. Definition and Structure

Wetting agents are composed of straight or branched hydrocarbon chain or chains, which can be alkyl, aryl or alkyl and aryl, which are more or less hydrophobic in character, with the addition of one or more groups of strongly hydrophylic nature, which act as solubilizing groups for the compound. The latter groups include SO_4H,-SO_3H,-PO_4H_2,-COOH,-OH etc.,-C=O,-CN, -CNS,-NO_2,-NH_2.

Their activity is dependent upon the ability to become oriented at an interface. This is possible because of the dual nature of the molecule - as indicated previously in reference to fatty acids, from which wetting agents obviously differ merely in that they are soluble, whereas, the fatty acids are relatively insoluble.

Two factors are of utmost importance in the design of a wetting agent:

(a) Solubility - may be achieved by:

1. The introduction of strong solubilizing groups, e.g., -SO_3H or -SO_4H.
2. Combination of groups as in alkali metal salts, amides, sulfonamides, mono, di, and tri hydroxy alkyl amines.
3. Introducing double bonds into saturated acids.
4. Introducing hydroxyl groups into the fatty acid.
5. Shortening the hydrocarbon chain.[10,11]

The water soluble groups endow properties which give at least colloidal solubility in water. Increase of chain length increases solubility in oils. As the number of carbon atoms increases to 8 or over, solubility decreases.

(b) Balance

Although balance is of value in wetting agents, it is of greater importance in emulsifying agents. The position of the solubilizing agent must be such that it will permit the orientation of the molecule. Introduction of double bonds increases solubility but the wetting power is not so good because the balance is upset since double bonds are definitely hydrophylic and hence there is a tendency for the hydrocarbon portion to be attracted by the aqueous phase.[10]

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[7]Draves, Carl Z., Clarkson, R.G., "A New Method for the Evaluation of Wetting Agents," Proc.Am. Assoc. Textile Chem. Colorists, 109-16 (1931)

[8]Cupples, H.L., "A List of Commercially Available Detergents, Wetting, Dispersing, and Emulsifying Agents," U.S. Dept. of Agriculture, E-504, June (1940)

[9]Bartell, F.E., "Wetting Agents," Ind. Eng. Chem., 33, 737 (1941)

[10]Dean, H.K., "Wetting Agents," Wetting and Detergency, Symposium, Chemical Publ. Co., N.Y. (1937)

Another factor which must be here considered is the stability of the substance to acids and the resistance to calcium and alkaline earth ions. The polar group is responsible for the sensitivity. The elimination of this disadvantage can be accomplished by chemical alteration, or blocking in the case of the -COOH group, so that, it is unable to react with the metals. This may be accomplished by amidation, esterification, or reduction to an alcohol with subsequent sulfonation.

II. Sulfonation

Treatment of a fatty alcohol with H_2SO_4 may have a two-fold effect. If chlorosulphonic acid is used at 30° C. an ester RCH_2OSO_2OH is formed. If fuming H_2SO_4 is used at 150°C. a true sulfonate where the sulfonic group is directly linked to the carbon RCH_2SO_3H is formed. Of the two, the true sulfonates are the more stable chemically, but quite often their detergent and saponaceous qualities fall short of the esters. Most of the compounds available in commerce are of the ester class including many which have erroneously been called sulfonated fatty alcohols. In the case of castor oil, however, its characteristic fatty acid, ricinoleic acid, contains an OH group and a double bond. The H_2SO_4 reacts with the OH to form the $-OSO_3H$ as well as with double bond to give the $-SO_3H$ linkage. It is, therefore, both a sulfonated and a sulfated oil.[12]

III. Classification

Wetting agents can be well classified on the basis of chemical structure. Brass[13] suggest the following:

1. Aliphatic Compounds
   (a) Derivatives of hydroxy fatty acids and sulfo fatty acids (Turkey red oils)
   (b) Derivatives of fatty acids
   (c) Derivatives of fatty alcohols
2. Aromatic compounds
   (a) Derivatives of naphthalene
   (b) Heterocyclic bases (pyridine)

Wilkes suggests a distinct correlation between the differences in wetting efficiency and the position of the hydrophylic group with respect to the non-polar portion. Table I is a classification on this basis.

The author has attempted to group the more popular commercially available wetting agents into these classifications.

1. Aliphatic Compounds
   (a) Derivatives of hydroxy fatty acids and sulfo fatty acids
      1. Sulfonated castor oil or olive oil - one of its disadvantages is its inability to resist the precipitation effect of lime salts and dilute mineral acids. Turkey red oil is a poor detergent.

   (b) Derivatives of fatty acids
      1. Propylene laurate - recommended as an emulsifying agent in cosmetics, pharmaceuticals and foodstuffs.
      2. Propylene stearate - recommended as an emulsifying and thickening agent. Is non-toxic, pure and free from alkalis.
      3. Glyceryl monstearate.
      4. Lamepon A - a protein fatty acid condensate.
      5. Artic Syntex M Beads, Flakes and Liquid

TABLE I

Group	Type No.	Formula	Description
A	1	$RCOONa$	Soaps
	2	RSO_4Na	Fatty alcohol sulfates
	3	$RCONHC_2H_4SO_4Na$	Sulfated fatty acid amides
	4	$RCOOC_2H_4SO_4Na$	Sulfated fatty acid esters
B	1	$R^1\text{-}CH_2SO_4Na$	Secondary alcohol sulfates
	2	$R^1\text{-}OOC\text{-}CH_2$ $R^1\text{-}OOC\text{-}C(H)\text{-}O\text{-}SO_3Na$	Sulfated esters of higher alcohols and dibasic acids
	3	$R^1\text{-}Ar\text{-}SO_3Na$	Alkyl aryl sulfonates
	4	$R^1\text{-}OOC\text{-}CH_2$ $R^1\text{-}OOC\text{-}C(H)\text{-}SO_3Na$	Sulfonated esters of alcohols and dibasic acids

R = fatty alkyl group
R^1 = primary or secondary non fatty alkyl group
Ar = aryl or aromatic

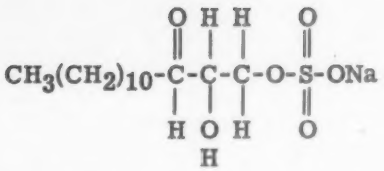
In group A are listed the various types derived from fatty sources. The polar or water soluble groupings in all these compounds is a primary one located at the end of the non polar portion of the molecule. In contrast, Group B presents the available types of the more truly synthetic surface active compounds. Each of these types contains its polar group in a secondary position with the non polar portion extending from it in two directions.[14]

[11] Caryl, C.R., Ericks, W.P., "Esters of Sodium Sulfosuccinic Acid," Ind. Eng. Chem., 31, 44-7 (1939)

[12] Evers, N., "Detergents and Wetting Agents - Sulfonated Oils," Pharm. J., 140, 326-7 (1938)

[13] Brass, K., Beyrodt, A., "Wetting Agents and Their Examination," Monatschr. Textil. Ind., Trade Issue II, 50, 53-6

[14] Wilkes, B.G., Wickert, J.N., "Synthetic Aliphatic Penetrants," Ind. Eng. Chem., 29, 1234 (1937)



Sodium salt of sulfated monoglycerides (from cocoanut oil fatty acids). These sulfates of mixed fatty acid monoglycerides are also marketed as shampoo (Halo) and as a detergent (Vel).

(c) Derivatives of fatty alcohols.

1. Erroneously called sulfonated fatty alcohols. Lauryl alcohol sulfate - Sulfonated Lorol.
2. Lanette Wax - 10 per cent of the sodium sulfate of octadecyl alcohol with cetyl and other alcohols.
3. Ocenol KD - oleyl alcohol - is resistant to oxidation and may supplement or supplant castor oil or liquid petrolatum in ointments. In addition to having lubricating and cleansing action it renders the skin soft and smooth.
4. Triethanolamine and its fatty acid soaps. The oleate is most familiar. The soaps are formed by the interaction of the anhydrous base with the fatty acid in proportion to their equivalent weights.

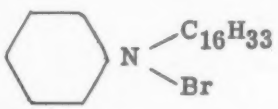
2. Aromatic Compounds

(a) Derivatives of Naphthalene

1. Aerosol OS - isopropyl naphthalene sodium sulfonate. Useful as adjuvant to alkaline detergents.
2. Nekal A - sodium alkyl naphthalene sulfonate. A useful detergent. (Alkanol, Invadine N)

(b) Heterocyclic bases

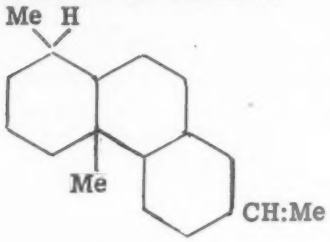
1. Cetyl pyridinium bromide



2. Cepryn chloride - cetyl pyridinium chloride
3. Emulsol 660 B - lauryl pyridinium iodide

(c) Phenolic substances

1. Areskap - sodium monosulfonate of butylphenylphenol
2. Aresket - sodium monosulfonate of monobutyl diphenyl
3. Abietene sulfonic acids



Abietene

4. Ammotate - Ammonium oleoabietate
5. Naphthenic acids - cyclic hydrocarbons with a ring structure. (Sulphosopes, sulphosol) Recommended as a base for soluble oils.

3. Group A - Fatty Alkyl Groups

2. Fatty Alcohol Sulfates

1. Dreft - contains 50% Na_2SO_4; of the organic substances 25% of the total is Na lauryl sulfate, the other 25% consists of compounds very similar in structure and properties, the Na_2SO_4 esters of decyl, myristyl cetyl and oleyl alcohols.
2. Drene - triethanolamine lauryl sulfate
3. Duponol ME Dry - Gardinol - sodium lauryl sulfate
4. Duponol LS, Ocenol - sodium oleyl sulfate $CH_3(CH_2)7CH{:}CH(CH_2)OSO_3Na$
5. Teel - sodium alkyl sulfate

3. Sulfated Fatty Acid Amide

1. Igepon T - fatty acid ester of a sulfonated aliphatic amido compound: $CH_3(CH_2)_7CH{:}CH(CH_2)_7CON(CH_3)CH_2-CH_2SO_3Na$
2. Intramine - sodium salt of sulfonated lauryl and myristyl collamide

4. Sulfated Fatty Acid Esters

1. Igepon A - oleic acid ester of a sulfonnated aliphatic compound: $CH_3(CH_2)_7CH{:}CH(CH_2)_7COOCH_3CH_2SO_3Na$

4. Group B

1. Secondary Alcohol Sulfates

1. Tergitol 08 - sodium 2-ethyl hexyl sulfate
2. Tergitol 4 - sodium tetradecyl sulfate
3. Tergitol 7 - sodium heptadecyl sulfate

2. Sulfated Esters of Higher Alcohols and Dibasic Acids
   1. Aerosol OT - di octyl sodium sulfo succinate
   2. Aerosol MA - di hexyl sodium sulfo succinate
   3. Aerosol AY - di amyl sodium sulfo succinate
   4. Aerosol IB - di butyl sodium sulfo succinate

3. Alkyl Aryl Sulfonates
   1. Alkanol E - sodium alkylnaphthalene sulfonate
   2. Nacconal NR - alkyl aryl sulfonate
   3. Sulfonated aryl stearic acids
4. Sulfonated Ester of Alcohols and Dibasic Acids.
   None thus far described

5. Quarternary Ammonium Salts
   A group of extremely active substances which does not fit into the classification given - these include:

   1. Triton K-12 - cetyl dimethyl benzyl ammonium chloride
   2. Triton 60 - lauryl dimethyl benzyl ammonium chloride
   3. Retarder LA - stearyl trimethyl ammonium bromide
   4. Hiperocide - alkyl hydroxy benzyl dimethyl ammonium phosphate.

PROPERTIES IN RELATION TO STRUCTURE

The wetting properties of fatty acids are improved by the use of salts of other basic compounds especially NH_4 and its derivatives. Fatty alcohol sulfuric esters generally have greater wetting and detergent powers than the sulfonates. With the sulfated saturated alcohols these powers decrease from C_{12} to C_{18}. They are improved if the solubilizing group is located near the center of the aliphatic chain or on a branched chain instead of at the end of the molecular structure of the hydrophobic group. In pyridinium bodies wetting is dependant upon the length of the substituted fatty chain and is most pronounced in the C_{10} compound. Dioctyl ester of sodium sulfosuccinate is the most effective wetting agent when compared with all others. The sulfonated arylstearic acids are more stable than compounds with the ester linkage.[15,16,17]

The detergent properties of the sulfated saturated alcohols increases from C_{12} to C_{18}. The aliphatic alcohol derivatives have good detergent properties but have not the smooth lubricating feel characteristic of soap suds. Sulfonated lauryl alcohol, however, has great lathering power. Of the pyridinium compounds, the best detergent qualities are in the C_{16} to C_{18}. The secondary alcohol sulfates are equally good detergents.[18]

TOXICITY

No all inclusive statement can be made. The safety of the preparation to be used in the quantity and the purpose intended should be clearly established. Experiments[19] on rats and guinea pigs demonstrated that Aerosol OT is not toxic internally. Locally it was applied to 200 human wounds by means of gauze dressings without harmful effects. No toxic effects were found when sodium alkyl sulfate was administered to animals in massive doses. "Tergitol" Penetrants have been demonstrated not to be entirely safe for oral administration.[20] Decylbenzene sodium sulfonate 0.1% caused disintegration of the epithelial surface of nasal mucosa practically at once.[21] Experiments are in progress to determine whether this effect may be valuable in the elimination of pathological secretions.

APPLICATIONS

I. Dental

Dental authorities have been somewhat antagonistic to the presence of soap in tooth powders and pastes. The sulfonated compounds have all the advantages of soap with none of its disadvantages and are seemingly non-toxic. In an attempt to utilize these properties liquid dentrifices, free of abrasives soon appeared on the market. One of the most popular "Teel" is an

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[15] Caryl, C.R., Ericks, W.P., "Esters of Sodium Sulfosuccinic Acid," Ind. Eng. Chem., 31, 44-7 (1939)

[16] Stirton, A.J., Peterson, R.F., Groggins, P.H., "Sulfonated Arylstearic Acids Wetting Properties of the Sodium Salts," Ind. Eng. Chem., 32, 1136-7 (1940)

[17] Chemitex, "Wetting and Dispersing Agents," Mfg. Perfumer 223, (1937)

[18] "The Tergitol Penetrants," private communication, Carbide and Carbon Chemicals Corporation, 1941

[19] French, E.D., "Experiences with Hydrophil Bases and Sulfonated Products" The Southern Medical Journal, 34, 284-7 (1941)

[20] "Physiological Action of the Tergitol Penetrants," unpublished report, Chemical Hygiene Fellowship, Carbide and Carbon Chemicals Corporation, N.Y. (1941)

[21] Proetz, A.W., "Action of Drugs on the Nasal Mucosa," Arch. Otolaryngol., 30, 509-15 (1939)

aqueous solution containing: sodium alkyl sulfate, glycerin, sugar and a thickening agent. It has proven to be very effective with no injury to the gums or teeth.[22] In search for a compound which could effectively inhibit the metabolism of microorganisms found in lesions of dental caries or in plaques associated with such caries, the action of a quartenary ammonium salt, alkyl dimethyl benzyl ammonium chloride, (Zephiran) on these bacteria was studied. The compound showed pronounced inhibitory effect, excellent powers of penetration and cleansing and low toxicity.[23]

II. In Use as and with Antiseptics

Cowles[24] examined the inhibitive powers of the alkyl sulfates. He concluded that the R-O-SO_3 Na type exert a pronounced effect upon all Gram positive organisms but not upon Gram negative. Against staphylococcus the inhibitory action increases from C_4 to C_{12} with regularity.

Minich[25] claims that the therapeutic and aniseptic properties of naphthenic acids are quite marked. The alkali naphthenates possess a far greater bactericidal potency than any of the soaps.

Friedlander[26] obtained the following results when testing the action on Tubercle Bacilli with their enveloping fatty capsules:

Drug	Prevents	Retards
Nacconal NR	1:5,000	1:40,000
Aerosol OT - 100	1:5,000	1:40,000
Aerosol OS	permitted growth at 1:1,000	
Zepheran	1:80,000	1:400,000

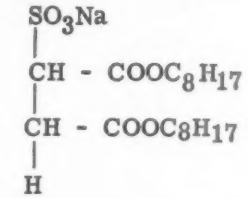
Gershenfeld[27] found that Aerosol OT exerts a marked increase in bactericidal efficiency with an increase in the hydrogen ion concentration. The following dilutions killed Staphylococcus aureus within 5 minutes at the pH noted:

Dilution	pH
1:2,000	6.6
1:4,000	6.0
1:30,000	5.0
1:40,000	4.0

In another series of tests[28] the possibility of the use of Aerosol OT as an adjuvant to chemical disinfectants in the destruction of bacteria by increased penetration and rate of diffusion was studied. Of the six antiseptics studied in combination with a non-bactericidal concentration of Aerosol OT at various pH values, phenol, bichloride of mercury, solution Merthiolate (1:1000) and Hexylresorcinol (1:1000) exerted a marked increase in bactericidal efficiency with an increase in the hydrogen ion concentration of the mixture. Zonite and Zephiran showed no increase in action due to chemical incompatibility with Aerosol OT.

In a study of the bactericidal action of the surface tension depressants themselves, Gershenfeld concluded that the action is not due apparently to reduced surface tension but in all probability to the molecular structure. From a chemical standpoint he classifies the depressants into three main groups:

1 - Anionic surface active compounds, which have the active or non-polar portion of the molecule carrying a negative charge.
Example: Aerosol OT - di-octyl sodium sulfosuccinate:



which ionizes with the hydrophobic group in the anion as follows:
$Na^+ + C_{20}H_{37}O_4SO_3^-$

[22] Procter & Gamble, "Teel and Its Place in Oral Hygiene" p. 7.

[23] Miller, B.F., Baker, Z., Harrison, R W., "Action of a Quartenary Ammonium Type of Wetting Agent on Metabolism of Microorganisms Associated with Dental Caries," Proc. Soc. Exptl. Biol. Med., 42, 705-6 (1939)

[24] Cowles, P.B., "Bacteriostatic Action of Alkyl Sulfates," Yale J. Biol. Med., 11, 33 (1938)

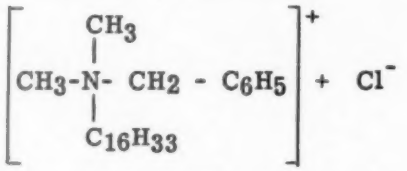
[25] Minich, A., Levison, H , "Soaps of Naphthenic Acids," Textile Colorist, 60, 698-9 (1938)

[26] Friedlander, B.L., "Bacteriostatic Action of Various Wetting Agents Upon Growth of Tubercle Bacilli in Vitro," Proc. Soc. Exptl. Biol. Med., 44, 51-3 (1940)

[27] Gershenfeld, L., Perlstein, D., "Significance of Hydrogen Ion Concentration in the Evaluation of the Bactericidal Efficiency of Surface Tension Depressants," Amer. Jour. Pharm., 113, 89-92 (1941)

[28] Gershenfeld, L., Perlstein, D , "The Effect of Aerosol OT and Hydrogen-Ion Concentration on the Bactericidal Efficiency of Antiseptics," Amer. Jour. Pharm., 113, 6 (1941)

2 - Cationic surface active compounds, which have the active or non-polar portion of the molecule carrying a positive charge.
Example: Triton K-12 - Cetyl dimethyl benzyl ammonium chloride:



3 - Non-ionized compounds, such as the polyglycerol esters.[29]

The cationic depressant, Triton K-12, exhibited its greatest efficiency in the alkaline range and was slightly more effective against Eberthella typhi, a gram negative organism than against Staphylococcus aureus, a Gram-positive organism. The anionic depressants, Aerosol OT, Tergitol 4, exhibited their greatest efficiency in the acid range of pH, and were more effective against Staphylococcus aureus. Petroff[30] had previously reported the influence of Tergitol 4 and 4T in enhancing the killing power of Azochloramid. Palitz[31] had excellent results in using this mixture as an irrigating fluid in empyema.

III. Detergents

The oldest and most important types of wetting agents are the soaps. However, they have several objections and disadvantages:

1. They form scums with calcium and magnesium
2. Cannot be used in salt water or hard water
3. In acid media there is a separation of free fatty acid, which impairs the detergent properties.
4. Must be used in alkaline solution. Alkaline soaps soften the epidermis and may penetrate the horny layer of the skin to the germinal layer where they produce irritation. The normal healthy skin is acid and possesses a weak buffering action.
5. Are liable to turn rancid.

The Turkey Red Oils form soluble calcium and magnesium salts but are poor detergents. It was found that the higher the degree of sulfonation, the greater the stability in hard water but the less the value of the scouring agent. The ultimate goal was a material with soap-like properties having perfect stability against hard water, acids, alkalis, metallic salts and with the highest wetting power. The wetting agents fulfill these requirements quite thoroughly.

The lower sulfated fatty alcohols C_{12} to C_{18} (lauryl) give the best detergents. They are unaffected by free acids and their calcium and magnesium salts are water soluble.

Igepon A and T are better than the sulfated oils. They are an excellent addition to soap and mixtures of the two are in regular use where small quantities will improve usefulness.[32]

Evans[33] points out that the cationactive wetting agents such as the quartenary ammonium salts - cetyl pyridinium chloride $(C_{16}H_{33}NC_5H_5)^+ Cl^-$ - charge the surface of the substrate positively and since most dirt is negatively peptisable they are not normally good washing agents. He concludes that only substances with surface active anions can be detergents in the true sense of the world.

Two hundred seventy-nine cases from 10 dermatologic clinics reported results of the use of sulfonated oils as detergents where soap was contraindicated. In most cases treatment with mild ointment was recommended along with the use of the sulfonated oil. Eighty per cent of the patients showed improvement and in only 8 per cent did

[29]Gershenfeld, L., Milanick, V.E., "Bactericidal and Bacteriostatic Properties of Surface Tension Depressants," Amer. Jour. Pharm., 113, 8 (1941)

[30]Petroff, S.A., Schain, P., "The Enhancement of Bactericidal Properties of Well Known Antiseptics by Means of Detergents," Quarterly Bull. Sea View Hospital, 372-89, (1940)

[31]Palitz, L., Herman, M., "Treatment of Tuberculous and Mixed Infection Empyema with New Irrigating Solutions," Quarterly Bull. Sea View Hospital, 181-196 (1941)

[32]Evers, N., "Detergents and Wetting Agents," Phar. J., 140, 326-7 (1938)

[33]Evans, J. G., "Some Interesting Properties of Surface Active Substances," J. Soc. Dyers Colorists, 51, 233-40 (1935)

the condition become worse. One patient acquired hypersensitivity to the oil. It was suggested that most patients can use sulfonated oil advantageously with no irritation and can maintain satisfactory hygiene. It is particularly useful for the removal of ointments in treatment of the scalp.[34]

It was thought in the early days of wetting agents and synthetic detergents that they would replace soap in many uses. The wetting agents employed up to this time have been soap substitutes to a limited extent but their largest uses have been in the fields where soaps are not used or cannot be used.[35]

IV. Dermatological

Treatment of cutaneous diseases is dependant upon local and topical application of medicaments. Permeability and absorbitivity are of utmost importance. The rate of absorption is dependent upon the vehicle as well as the drug. In this connection the most prevalent types of preparation include:

1. Ointments and creams
2. Aqueous lotions
3. Emulsions

Each of the above has its obvious disadvantages. Ointments of the greasy type hinder the activity of the substance incorporated since they do not permit adequate dispersion or solution of the active ingredient. They are impermeable to secretions and exudations and are difficult to remove from the clothing. In an attempt to overcome this difficulty the use of the so-called water soluble bases, which permit ready dispersion of colloids and of crystalloids and bases capable of absorbing water, has greatly increased. The wetting agents have contributed much toward the characteristics of these bases. A description of the more popular combinations follows:

(a) Cetyl Alcohol - is an excellent emollient, stable and free from a tendency to irritate. It gives a soft velvet-like texture to the skin, mixes with both animal and vegetable oils and fats, and when so combined or emulsified, becomes hydrophil, so that water can be added. It is not influenced by weather, does not polymerize, oxidize or turn rancid. It gives smoothness, homogeneity, penetrating properties and stability to a cream.[36] When used alone, it is not a good emulsifier, so that, it is more frequently combined with other compounds.

(b) Lanette Wax - the following formula has been recommended for combination with Phenol, Whitfield Combination, Burow's Solution, Ichthammol, Rectified Oil of Birch Tar, Sulfur, Ammoniated Mercury, Coal Tar and Balsam of Peru:[37]

Lanette Wax	2 parts
White Petrolatum	2 parts
Liquid Petrolatum	3 parts
Distilled Water	7 parts

Lanettewax is 10 per cent of the sodium sulfate of octadecyl alcohol with cetyl and other alcohols.

(c) Ocenol KD - is compatible with hydrous wool fat, petrolatum, stearic acid, yellow wax, cetyl alcohol, cholesterol, and lecithin, and may be used to supplement or supplant the above. When added to the oil phase of an emulsion, it will increase the stability of the emulsion through finer particle size. The following formula has been recommended for the combinations indicated in (b), except that with Rectified Oil of Birch Tar, with which it is incompatible, and Burow's Solution where it is not "washable."[37]

	Per cent
Ocenol KD	8.0
White Wax	9.0
Sodium Borate	0.2
Cetyl Alcohol, technical	8.0
Duponol ME dry	0.6
Liquid Petrolatum	17.0
Water	57.2

(d) Triethanolamine - the stearate is especially adapted for preparations where color is of first importance and in emulsification of waxes. It is neutral in reaction; has no irritating effects; is completely washable; and may be improved by the addition of glycerol.[38] The following formula has been recommended for use in all instances indicated in (b) except with Ichthammol and Balsam of Peru:[37]

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[34] Blank, I., "Sulfonated Oils as a Detergent for Diseases of the Skin," Arch. Derm. and Syphil., 43, 443, (1941)

[35] Lenher, S., "The Expanding Applications of Wetting Agents," Chem. Industries, 48, 324-6 (1941)

[36] Jennaway, S.P., "The New Cetyl Alcohol Cosmetics," Perfumery and Essential Oil Record, 27, 154-6 (1936)

[37] Powers, J.L., "Study of Washable Ointment Bases," J.A.Ph.A., Practical Addition 2, 467 (1941)

[38] Wilson, A.L., "Triethanolamine Emulsions," Ind. Eng. Chem., 22, 143-6 (1930)

	Per cent
Stearic Acid	14.0
Triethanolamine	0.7
Cetyl Alcohol	3.0
Duponol C	0.5
Glycerin	5.0
Water	76.8

(e) Duponol ME Dry, Duponol Special WA Paste - (sodium lauryl sulfates) - The following formula has been recommended except for use with Phenol, Burow's Solution, Rectified Oil of Birch Tar and Balsam of Peru:[37]

	Per cent
Spermaceti	20.0
Paraffin	10.0
Liquid Petrolatum	15.0
Cetyl Alcohol	1.5
Duponol ME Dry	1.0
Stenol (Octadecyl Alcohol)	5.0
Distilled Water	47.5

It is an excellent emollient, non soiling, washes off readily from the skin, hair and clothing; is detergent, reduces surface tension allowing for immediate absorption and thereby increasing the efficiency of all medicaments as well as producing a cooling effect by evaporation. It leaves only a small film of oil on the surface of the skin.[39] Duponol Special WA Paste, because of its greater solubility, is preferred for preparations which are intended to remain clear.

(f) Aerosol OT - vanishing, cleansing and liquefying creams can be made by using Aerosol OT dry in conjunction with the proper substances to produce practically any type of product desired. The following is a typical formula for a cream:[39]

	Per cent
White Wax	11
Paraffin	10
Liquid Petrolatum	40
Water	29
Aerosol OT 10% in aqueous solution	10

French[19] found no incompatabilities with the following base. It is easy to remove from the scalp and is an extremely good vehicle in which to incorporate sulfanilamide or sulfathiazole. It has a very definite softening action.

	Per cent (Approximate)
Mineral Oil	15.0
Paraffin	10.0
Spermaceti	20.0
Cetyl Alcohol	15.0
Water	47.5
Sodium Lauryl sulfate	1.0
Stenol (Octadecyl Alcohol)	5.0

Gattefosse[39] contends that a cleanser of acid pH should be preferred in treatment of pustular acne and suggests the following:

Diethylene Glycol	200 parts
13% Sodium Lauryl Sulfate	200 parts
Rose Water qs.ad	1000 parts

The surface tension of water in aqueous lotions is usually too great to permit penetration or adsorption. If alcohol is incorporated in sufficient concentration to lower the surface tension it is often irritating. Vegetable gums, which are at times added to increase viscosity or adhesiveness, on evaporation adhere to the skin as an insulating film. Oil-in-water emulsions are objectionable because of the alkalinity of the soap and poor dispersion of the oil. Wetting agents, obviously, improve these preparations. Aerosol OT has unique properties in this regard. The following is a semi-fluid lotion which has excellent softening properties, yet, does not produce an oily effect:[39]

	Per cent
Cetyl Alcohol	2
Stearic Acid	2
Liquid Petrolatum	10
Aerosol OT 10% aqueous solution	10
Water	76

It is also useful in scalp lotions:[18]

Salicylic acid	2 parts
Resorcin	2 parts
Diethylene Glycol	30 parts
Aerosol 1% qs. ad.	100 parts

For dry hair and conditions of the scalp the following formula is of use:[39]

Aerosol OT dry 100%	10 parts
Olive Oil	90 parts

The clear product which results resembles the original olive oil in appearance. When used it produces a copious lather which is dense and stable.

Duemling demonstrated in a series of tests that wetting agents greatly enhanced the penetration and dispersion of drugs. Relative strengths of the medicinal should not be overlooked as far weaker preparations will accomplish the same results in a base of this type. As all other medicinals used in topical application, wetting agents are definite sensitizing agents. A therapeutic mixture intended for use on diseased skin for a limited time may have its advantages.

(Continued on page 209)

[39]Duemling, W.W., "Wetting Agents - New Chemicals of Use in Finer and More Efficient Topical Dermatological Therapy," Arch. Derm. and Syphil., 43, 264-278 (1941)

ORGANIZATION NEWS

NEW JERSEY SOCIETY OF HOSPITAL PHARMACISTS

A regular monthly meeting of the New Jersey Society of Hospital Pharmacists was held at Rutger's College of Pharmacy, Newark on December 19. Mr. Albert W. Moore, Pharmacist of the Englewood Hospital Association conducted a general discussion on "Hospital Pharmacy." Other meetings of the New Jersey group include the November 21 program at which the importance of the hospital pharmacy and its relation to the hospital staff, nurses, and patients were discussed; "The Hospital Pharmacists Talk it Over" was the subject of the October 17 session; while at its initial Fall meeting, the group elected officers and heard a talk by Mr. Albert Moore on "The Constitution and By-laws." Officers of the group include President Lena Cutler of Newark Memorial Hospital, Vice President Charles Seal of Muhlenburg Hospital, Plainfield, Secretary Jennie Cutler of Orange Memorial Hospital, Treasurer Grace Huber of the Bayonne Hospital and Dispensary, Maurice D. Newman is chairman of the Publicity committee.

CLEVELAND SOCIETY OF HOSPITAL PHARMACISTS

More than 30 members of the Cleveland Society of Hospital Pharmacists met October 30 at Cleveland Clinic to hear a review of alcohol reports and records presented by Mr. Dawson of Physicians and Surgeons Hospital. The Meeting was called to order by chairman Miller. Mrs. E. G. Scott reported on the work of the committee to increase the American Pharmaceutical Association membership in Cleveland. Mr. Stimson announced that at the convention it was decided that the national Society would issue no refunds to local groups.

At its September 25 meeting held at Glenville Hospital Mr. Decker and Mr. Sisk reported on the Institute on Hospital Pharmacy held in July at Ann Arbor. Dean Wyss discussed events at the A.Ph.A. convention, particularly the plans for the survey of pharmacy by the committee of the American Council on Education. A committee composed of Mrs. Scott, Dean Wyss and Mr. Stockhaus was appointed to sponsor a plan to organize a large active A.Ph.A. group in the greater Cleveland area, this organization to be made up of all registered pharmacists.

THE GREATER NEW YORK CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS

The October meeting of the Greater New York Chapter of the A.S.H.P. was held at St. Michael's Hospital, Newark, New Jersey. Sister Etheldreda, chairman, presided. Sister Donatus and Sister Etheldreda reported on several of the topics presented at the Institute on Hospital Pharmacy. After the meeting the members visited the Pharmacy Department of St. Michael's Hospital of which Sister Clariss is the pharmacist.

The September meeting of the same group was held at St. Francis Hospital, the Bronx, N.Y. Sister Etheldreda who had attended the convention of the Catholic Hospital Association in Milwaukee and had served as chairman of the Forum on Hospital Pharmacy reported on the topics discussed. Sister invited the members to prepare topics for next year's program and also asked for suggestions for the Pharmacy Exhibit to be held during the Catholic Hospital Association Convention. After a discussion the group went on record as favoring the maintainence of THE BULLETIN as a separate publication. The principal talk of the evening was given by Sister Mariam of St. Elizabeth's Hospital, Newark, who spoke on "Proteins and Amino Acids."

THE SOCIETY OF HOSPITAL PHARMACISTS METROPOLITAN AREA, NEW YORK CITY

The Society of Hospital Pharmacists, Metropolitan Area met at the New York College of Pharmacy, Columbia University December 5 with Mr. Robert R. Gerstner, president of the New

York State Board of Pharmacy as guest speaker. Mr. Morris Dauer, president of the Society discussed plans for the affiliation of the group with the American Society of Hospital Pharmacists.

At its January 16 meeting the group will hear a report on the progress of affiliation with the national Society and will listen to Mr. F. F. Berg, superintendent of the Pharmaceutical Laboratories of E. R. Squibb and Sons discuss the "Manufacture and Control of Pharmaceutical Preparations."

THE HOSPITAL PHARMACISTS ASSOCIATION OF GREATER ST. LOUIS

The regular meeting of the Hospital Pharmacists Association of Greater St. Louis was held October 10. Mr. Francis M. Rudi of the Missouri Pacific Hospital presented a resolution that the group affiliate with the American Society of Hospital Pharmacists. The resolution was adopted and a copy of the Constitution and By-Laws have been forwarded to the national secretary, together with a membership list. Many new members have been obtained by the St. Louis group for the A.S.H.P. and for the A. Ph. A. Frieda J. Ziegler of the Evangelical Deaconess Hospital is secretary of the St. Louis Association.

THE MARYLAND ASSOCIATION OF HOSPITAL PHARMACISTS

The Maryland Association of Hospital Pharmacists held a meeting in conjunction with the Maryland - District of Columbia Hospital Association on November 26. More than 65 hospital pharmacists attended the Section on Hospital Pharmacy of which Dr. Arthur Purdum, chief pharmacist at Johns Hopkins Hospital, Baltimore served as chairman. Mr. L. M. Kantner, Deputy Food and Drug Commissioner of Maryland spoke on the pharmacists work in the hospital and mentioned the recent trends in the erection of many new hospitals. Dr. DuMez, dean of the School of Pharmacy, University of Maryland discussed the educational requirements for hospital pharmacists. An informative movie on the treatment of poliomyelitis was shown.

THE AKRON HOSPITAL PHARMACISTS ASSOCIATION

The first meeting of the Akron Hospital Pharmacists Association was held in November. A general discussion on Hospital pharmacy was held and plans were formulated for future meetings.

THE MICHIGAN SOCIETY OF HOSPITAL PHARMACISTS

The next meeting of the Michigan Society of Hospital Pharmacists will be held in the ballroom of the Durant Hotel, Flint on Thursday January 30 at 7:30 P.M. Hosts for the evening will be the E. R. Squibb and Sons. A lecture and business meeting will immediately follow the dinner. A technicolor sound movie will also be shown.

WETTING AGENTS

(Continued from page 207)

However, they may increase the permeability of the skin to many complex substances including common allergens.[40]

CONCLUSION

The applications here described are by no means all inclusive or complete. The wide variety of miscellaneous uses in strictly related fields, such as, improving the swelling and spreading power and prevention of molds in adhesives; washing of insecticide sprayed fruit; histological staining methods; and cleansing and sterilizing of surgical instruments, can merely be mentioned. Space does not permit a thorough discussion. Let it be said that the possibilities are enormous and the margin of safety is still to be established. Skin irritations and infections frequently arise and opinion in this regard is divided.

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[40] Sharlit, H., "Possible Dangers in Use of Wetting Agents," Arch. Derm. and Syphil., 45, 154 (1942)

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